

AU/ACSC/0312/97-03

COST EFFECTIVENESS OF THE CIVIL ENGINEERING SELF- HELP PROGRAM

A Research Paper

Presented To

The Research Department

Air Command and Staff College

In Partial Fulfillment of the Graduation Requirements of ACSC

by

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March 1997

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.					
1. REPORT DATE (DD-MM-YYYY) 01-03-1997		2. REPORT TYPE Thesis		3. DATES COVERED (FROM - TO) xx-xx-1997 to xx-xx-1997	
4. TITLE AND SUBTITLE Cost Effectiveness of the Civil engineering Self-Help Program Unclassified				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Kasmer, James R. ;				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME AND ADDRESS Air Command and Staff College Maxwell AFB, AL36112				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME AND ADDRESS ,				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT APUBLIC RELEASE ,					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT Self-help began as a method for base organizations to perform minor tasks such as painting to upgrade their facility environment. Today self-help's role has expanded to include major projects which are completed during duty time. This project studied the cost effectiveness of the present day self-help program. The development of self-help is explained to establish the programs background. Senior Civil Engineering leadership was interviewed for their viewpoints on the program. Self-help centers were visited or contacted to determine existing operational practices. This information is analyzed to help determine if self-help has outgrown its cost effective use. This research project has determined self-help from a purely quantitative point of view, which includes the sunken cost of the labor used to perform the work, is not cost effective. However, when properly managed and executed as intended by existing regulations, coupled with the pride of ownership factor, it continues to be a viable method to accomplish work. Several findings require further review. The existence of full-time organized self-help teams defeats the purpose of pride of ownership, and warrants a review of manpower standards. Lack of authorized manpower positions to operate the self-help centers jeopardizes both the quality of self-help work, and Civil Engineering inhouse maintenance capability.					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:		17. LIMITATION OF ABSTRACT Public Release	18. NUMBER OF PAGES 39	19. NAME OF RESPONSIBLE PERSON Fenster, Lynn lfenster@dtic.mil	
a. REPORT Unclassified	b. ABSTRACT Unclassified	c. THIS PAGE Unclassified		19b. TELEPHONE NUMBER International Area Code Area Code Telephone Number 703767-9007 DSN 427-9007	
				Standard Form 298 (Rev. 8-98) Prescribed by ANSI Std Z39.18	

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Preface

The Civil Engineering self-help program has been a valuable tool as a work force multiplier, providing base organizations the opportunity to improve their facilities on their own. The concept of having a base store, where building custodians can obtain over the counter maintenance items without any paperwork is a quick convenient method to reduce the demands on the Civil Engineering workforce. By submitting a work request, organizations can obtain a wide array of materials to perform tasks such as wallpapering an office or building a break pavilion. Pride of ownership is a common theme in support of the program. As a Civil Engineering officer, I fully supported the concept of self help as a cost effective way to overcome our declining budgets and manpower authorizations. However, over the past few years, as our budgets continue to decline, I have seen an increased shift towards self-help to overcome facility deficiencies. The scope of projects have grown to the point where there are now full-time non-Civil Engineering personnel self help teams spending up to a year on one project. Wing commanders are endorsing self help as a great way to save money and perform projects that Civil Engineering cannot complete. I am concerned that we are placing too much emphasis on the program, and question if we are still receiving the cost benefits that the program originally provided. This research paper will address these issues, with the hope to provide a starting point towards a more in-depth review of the program and its future direction.

I want to thank the senior Civil Engineering leadership who provided me with their insights and experience into the program. I also want to thank the individuals who run the self help centers for their time and information on their programs. I want to give a special thanks to Mr. Alan Purser of the Civil Engineering squadron at Maxwell AFB, AL, for his support. And finally I want to thank Major Bob Fant, a fellow CE officer, who volunteered to be my research advisor and provided insightful feedback towards the project.

Abstract

Self-help began as a method for base organizations to perform minor tasks such as painting to upgrade their facility environment. Today self-help's role has expanded to include major projects which are completed during duty time. This project studied the cost effectiveness of the present day self-help program.

The development of self-help is explained to establish the programs background. Senior Civil Engineering leadership was interviewed for their viewpoints on the program. Self-help centers were visited or contacted to determine existing operational practices. This information is analyzed to help determine if self-help has outgrown its cost effective use.

This research project has determined self-help from a purely quantitative point of view, which includes the sunken cost of the labor used to perform the work, is not cost effective. However, when properly managed and executed as intended by existing regulations, coupled with the pride of ownership factor, it continues to be a viable method to accomplish work. Several findings require further review. The existence of full-time organized self-help teams defeats the purpose of pride of ownership, and warrants a review of manpower standards. Lack of authorized manpower positions to operate the self-help centers jeopardizes both the quality of self-help work, and Civil Engineering in-house maintenance capability.

Chapter 1

Introduction

The Civil Engineering self-help program began as a method for base organizations to perform minor tasks such as painting to upgrade their facility environment. The work was to be performed during non duty time and exclude any work on mechanical or electrical systems. The program provided a quick, efficient, cost saving method for customers to improve their quality of life. Today, we have expanded self-help's role to include major projects which are completed during duty time, often by organized full time self-help teams. The trend towards self help has resulted from the drastic drawdown in manpower and operational budgets. Even during the days of the military buildup in the 1980's, Civil Engineering found it difficult to meet the demands of requests for minor construction projects. As a result, an ever increasing emphasis has been placed on self- help to counter the decreasing ability to complete projects. The minor paint-your-office projects still exist, but project scopes have expanded to include projects involving detailed planning, the ordering of thousands of dollars worth of materials, and require multidisipline craftsmanship skills to accomplish. This ever increasing use of self help to accomplish major projects presents the question: Has the present day Civil Engineering self-help program expanded beyond a viable cost effective method of accomplishing work?

The goal of this research is to take an in-depth look at the program to determine if it has grown to the point where, because of the size of the projects undertaken, the craftsmanship required for a quality project, and the manpower required to accomplish them, the program has lost its ability to be truly cost effective. Yes, self-help is filled with many examples of high quality work, has improved quality of life, and makes for an impressive commanders' interest showcase. Yes, Civil Engineering would not be able to accomplish a majority of the work done by self-help, so it would appear that it is indeed a wonderful cost saving means to improve quality of life. The intent is to show that due to costs not readily taken into consideration, self help should not be promoted as a cure all for Civil Engineering problems.

To answer the question, the development of the self-help program will first be explained to establish a background. Second, the views and concerns of the senior Civil Engineering leadership will be presented. It is important to note this project is being presented from a pure Civil Engineering perspective, and does not reflect senior Air Force leadership point of view. Information gathered from various CONUS self-help centers which provide the bulk of the information presented in this report will be discussed. The scope of this research has been limited to CONUS bases because of academic constraints, but it is assumed that the facts found overseas would be similar. Numerous base customers who have worked on self-help projects were interviewed to get a feel for just how much emphasis the pride of ownership factor truly plays. The above information will be analyzed and discussed to back the assumption the present day self help program has become a crutch, and has expanded to the point of no longer being cost effective.

Another important note to present is the researcher is a proponent of the self-help program as it was initially intended to operate, and presents this argument not against the concept of the program itself, but to the extent it is in some cases being used.

A majority of this project will result from interviews which will make some of the acquired information a matter of opinion. Despite these limitations, this paper will provide a great start for further review on whether or not the program should continue its present course.

Chapter 2

Background

To set the stage for the argument, self-help has become so popular and large that in many cases it is no longer cost effective, it is important to provide a background on the recent history of self-help and how it arrived at its present day operation. The existing instruction governing the program will be compared with its counterpart in the 1970's. The development and functions of the self-help store concept will also be explored. Finally, a brief description on the basic concept of daily operations and the functions provided by today's self-help centers will be discussed.

According to Air Force Pamphlet 32-1098, the purpose of the Civil Engineering Self-Help program is defined as follows: *self-help is a significant force multiplier, especially in constrained budget environments. It is a highly effective alternative for managing limited resources more effectively to improve quality of life for Air Force personnel. A successful self-help program improves facilities and fosters a feeling of pride and ownership.*¹ This compares favorably with the 1976 version of AFR 85-1 which stated the concept of self-help as follows: There are many instances where, due to funding or manpower limitations, an individual or organization cannot get necessary but low priority work accomplished by Civil Engineering by the desired date. In these instances, the requester has the option of deferring the work or furnishing the labor and material funds

from his resources.² It also states in the earlier version that self help may not always be cost effective. The Base Civil Engineer is ultimately responsible for work on real property and consequently, may have to correct deficiencies created by self-help work.³

The key point to note in AFR 85-1 is its emphasis on low priority work. At the time Civil Engineering worked under a four level priority concept where most of the top three levels were capable of being accomplished by the Civil Engineering squadrons. The majority of the self help requests fell into the level four category which basically represented a nice-to-have request. The regulation also goes into specific detail that the work requests involved should undergo a more critical review than normal requests, to ensure that the people doing the work had the capability to perform the work.

At the time, there were not any established self-help centers dedicated solely to monitor the work; however, the operations branch provided monitors to ensure projects were accomplished within standards. In most cases, the scope of projects being done were relatively small, and the program only accounted for a small percentage of the total work being accomplished on base.

To further enhance the ability of the program to meet base requirements, the concept of a U-Fix-It store was developed. This provided an area on base where building custodians could obtain materials over the counter in the same manner they would in a hardware store. The U-Fix-It stores became an efficient and cost effective way for building customers to readily take care of small day to day maintenance problems, relieving Civil Engineering of the burden. U-Fix-It stores thus evolved into the modern day self-help center.

In conjunction with the military buildup in the 1980's, the concept of self-help saw a remarkable expansion. The primary reason behind the increase was Civil Engineering had the capability to purchase more materials than they had personnel to perform the work. Self-help became a viable alternative to take advantage of the increased operational budgets. This included both Civil Engineering's budget as well as base organizations who in many cases funded their own projects. The continued development of the self-help store concept made it easier than ever to obtain materials to perform self-help work.

The replacement to AFR 85-1, AFR 85-2, dated October 1988, encouraged the active use of the program. In addition to everyday over the counter items, such as paint, receptacle covers, etc., the stores began to stock items such as floor tile and sheetrock. The centers developed areas to provide construction guidance, and a tool lending program. The ability to obtain just about any type of building material was readily accessible. Project scopes continued to grow. No longer were we talking about the minor paint your office project, or building yourself a bookshelf. In conjunction with the Air Forces' emphasis on the quality movement, large scale office renovations often affecting mechanical and electrical systems began to be conducted. The mode of the day was to replace painted walls with vinyl covered sheetrock, or wall coverings, construct drop ceilings, and lay ceramic tile or carpet. The abundance of funding for materials made it easy to get these projects approved, however often with little thought on where the funding would come from to maintain these upgrades in the future.

Wing and Base commanders provided strong support for the program as a means to upgrade facility appearance. During the 1980's, it should be noted that although the base Civil Engineering squadrons did not have the resources to meet all work requests, they

still had the capability to perform a large amount of minor construction work. However, the recent drawdown and cutbacks in both manpower and materials has affected the Civil Engineering squadrons to the point where little if any low priority work can be accomplished by the organization itself. The majority of manpower and financial assets remaining must be committed to everyday maintenance and repair of the infrastructure and road systems. The increased requirements to meet environmental regulations also detracts from their ability to meet basic base requests. This has placed an even greater emphasis on the self-help program to meet this growing gap.

The present day pamphlet, AFP 32-1098, governing the program states the key to a successful program is the sustained involvement of base leadership. The Base Civil Engineer should involve base leadership in promoting the program as a base responsibility, not just a Civil Engineering responsibility. AFP 32-1098 continues to state the heart of any self-help program is the self-help center, and the installation commander should view staffing the self-help center as a base responsibility, not just a Civil Engineering responsibility. With all the emphasis and increased demands placed on self-help, it is interesting that there are no authorized manpower positions to meet its responsibilities. This means the personnel assigned to operate the store are provided at the expense of another area of Civil Engineering. The same applies to a volunteer provided from the base pool of workers.

Notes

¹ Air Force Pamphlet 32-1098, 1 April 1996

² Air Force Regulation 85-1, 17 May 1976

³ Air Force Regulation 85-1, 17 May 1976, pg. 15-1

Chapter 3

Senior Civil Engineering Leadership Viewpoints

The purpose of this section is to provide an insight into the thoughts and experiences of the people ultimately responsible for the operation of the self-help program, the senior Civil Engineering leadership. Granted, their actions are often a reflection of the direction they receive from the senior Air Force leadership, but by and large, it is Civil Engineering leadership that sets the tone for the level of self-help involvement at base level. As previously stated, this paper is being presented from the Civil Engineering perspective. The viewpoints of senior Air Force leadership, who in many cases are the major proponents of the program, are not reviewed. The information being presented is a result of personal interviews, telephone conversations, and responses to E-mail requests for information on the subject, sent to the level of lieutenant colonel and above. All comments have been kept anonymous. This is a consolidation of the key points of what they had to say.

With the exception of one Base Civil Engineer, all of the individuals contacted were in agreement, if properly managed, self-help is a viable force multiplier that is here to stay. There is a difference of opinion between the directorate level leadership, and Base Civil Engineer and Operations officers, on the ability to support the manpower requirements to manage self-help. All agreed that a successful program is a result of motivated and

technically competent self-help store management. However, there are no authorized positions designated to operate the self-help centers. This is a major concern to most of the Base Civil Engineers and Chiefs of Operation who feel they can't afford to properly man the stores with personnel taken out of other work centers. This is in direct contrast with views of command leadership, who feel the bases should be able to find the available bodies to manage the centers. They feel any burden placed on the in-house operation is more than compensated by the increased benefit of the self-help projects.

There is a consensus the pride of ownership factor plays a major role in justifying the extra labor required to support self-help projects. This is especially true of the command level leadership. Units will take more responsibility for taking care of their respective working environments because they performed the work themselves.

Another concern of several Base Civil Engineers is the lack of a priority system to approve self-help projects. Since in many instances the money being spent on self-help materials is provided by the organization performing the work, projects are approved based on ability to perform and not priority. This increases the potential to forgo required maintenance at the expense of quality. Command leadership feels it is up to the Base Civil Engineer to present to the installation commander the impact self-help will have on daily responsibilities. Several Base Engineers feel they are being forced to meet Command specified goals or targets to perform self-help. Many would prefer to use funds designated towards self-help to further support the maintenance operations.

Everyone agreed manpower standards should be regenerated. The continued use of full-time organized self-help teams indicates an overabundance of manpower that could be put to better use by Civil Engineering. However everyone also came to the conclusion

this would probably never happen. It is generally believed future drawdowns will mandate the elimination of full-time teams as organizations will no longer be able to support them. Most discounted the sunken labor costs associated with the team's labor to perform the work because without it, the work would never get done.

Although everyone believes self-help is here to stay, there are differing views and opinions on the future levels of self-help. There is an even split between those that feel budget drawdowns will place greater emphasis on the program and it will continue to expand. The contrasting opinion is the drawdowns will eventually mandate a shift of self-help funding towards maintenance requirements, and the program will decline as a result.

In summary there is unanimous opinion among senior Civil Engineering leadership that self-help is a program worth the effort to support. There are enough contrasting viewpoints to warrant a further look at the amount of resources that should be dedicated towards the program to ensure optimum performance. The next chapter will cover the operational practices of a self-help center.

Chapter 4

Existing Operational Practices

This section of the paper will report the existing operational practices taking place at various self-help operations around the country. This information will provide the background to support the claim that upon closer analysis, self-help has grown to the point where it isn't always cost effective. The information presented here was compiled by several onsite visits, but mostly as a result of telephone interviews with the supervisors of 40 self-help centers. The intent of the research is to deal with work taking place on the functional areas of the base, and didn't get involved with the military housing self-help operations. The following information was obtained from the interviews and site visits.

1. The number of personnel designated to operate the center
2. The operational budget
3. The existing project workload and ability to monitor
4. If any full time organized self-help teams were operating on the base
5. Specific examples of the type of projects being performed on the base
6. Level of quality and cases of disruption to mechanical and electrical systems
7. Problems with non-approved projects and acquisition of materials
8. The tracking of labor hours used by organizations to perform the work
9. Impact of pride of ownership

In addition to the personnel working at the centers, over 50 individuals that performed self help work were questioned on just how big a role the pride of ownership factor influenced their efforts. Each of the above areas will now be described in more detail.

Number of personnel

One of the main concerns of the senior Civil Engineering leadership was the lack of authorized positions to operate the self-help centers. Providing personnel to the store comes at the expense of depleting one of the other areas of the squadron. Available craftsman has always been a problem for Civil Engineering squadrons. The regulation dictates that it is a base responsibility to man the store. But in many cases, the type of skills required to operate the store are not available, and if they are, how can they afford to leave their primary job without affecting their own unit's mission? Less than 20 percent of the stores contacted are receiving personnel support from the base. Store manning levels ranged from one to twelve persons. Table 1 on page 22 provides data from a 25 base sample. The impact of the number of personnel in the shop will be a major factor when covering the topic of being able to properly monitor the work going on.

Operational Budget

Self-help budgets were once again a major interest item of the Civil Engineering leadership. The growing concern is declining operational budgets to maintain the basic base infrastructure, and paying for utility systems. Many question their ability to support self-help projects directed towards nice-to-have or beautification projects when they can't perform basic maintenance and repair responsibilities. Most of the major commands allotted two million dollars towards self help to be dispersed according to size throughout their bases.

Funds are used for two different purposes. The first is to stock over-the-counter items that do not require a work request to obtain. These include items such as electrical plate

covers, caulking, paint and doorknobs etc. This allows building custodians a convenient way to quickly obtain and fix small maintenance and repair problems in their facility. The second area of funding in the store supports materials to be used towards projects done by other than Civil Engineering personnel.

A majority of the base Civil Engineers were given the option to either put funds towards their operational budget, or use it in the self help operation. In many cases commanders felt obligated to use the money in support of self help due to installation commander direction, or a sense of obligation to meet command suggested self-help goals. The command or installation directed self help goals range from 5 to 15 dollars per person on base.

No definitive trend came to light in terms of funding direction. Several of the bases were starting to have their Civil Engineering funding sources reduced. In most cases however, this reduction was replaced with funds supplied by organizations purchasing their own materials. Budgets ranged from a low of \$75,000 to an upper level of \$800,000.

Project workloads

The main goal here is to determine the amount of personnel available to properly monitor the amount of work taking place on the base. It is Civil Engineering's responsibility to monitor and inspect the work going on to ensure quality standards, construction codes, and environmental regulations are being maintained. The area of environmental regulation has become increasingly important in dictating what type of materials you are authorized to use, and how to deal with items such as asbestos.

Construction codes are also becoming more stringent, especially for electrical work, and in the area of hurricane prevention for bases located in susceptible areas. Another area of key concern is the type of materials required to perform the job. Fire ratings for materials are different for base facilities than at home.

Many of the laborers are quick to assume the way they did it at the house, will also work at the office. No matter how well a project is planned, in many instances, once construction has started, unknown factors become a player. There are also many cases when the organization requesting a project isn't quite sure exactly what they want until they start, and come up with an additional or different idea. This often leads to on the spot changes at the direction of a commander or shop supervisor.

It is vital there be sufficient manpower available to routinely inspect these jobs to ensure problems are identified before they arise, and prevent the waste of materials and labor hours. The majority of the bases did not have sufficient manpower to properly monitor the project workload as designed. In many cases there is only one person responsible for the entire operation. This includes running the over-the-counter operation, planning and developing the material lists for projects, issuing materials, maintaining the paperwork associated with projects, working as a coordinator for projects requiring Civil Engineering involvement, and performing the inspection function. In these cases, the store person stated they often had to rely more on the ability of the organization doing the work, with hope they knew what they were doing, as time didn't exist to do the job as required.

Some of the bases have begun to rely on the Zones, which are Civil Engineering shops designated to an area of the base to perform maintenance, for help. This is a great

idea and something that should be instituted Air Force wide. With organized self-help teams becoming more popular, the need to provide guidance and oversee job performance has been reduced. The organized team concept will be explained in more detail in the next section.. See table one for the amount of projects taking place at various bases.

Full time organized self-help teams

Full time organized self-help teams have been around for sometime, with the research showing a growing trend towards more individual organization and base sponsored teams. The size of these teams ranged anywhere from a two person operation up to twenty. Some of the bases had up to four different teams operating on the base. The majority of the teams are comprised of non-Civil Engineering personnel who are detailed to a team for anywhere from three months to indefinitely. They are, in many cases, individuals with some type of craftsmanship skill, and in most cases are volunteers to the team. Several of the teams possess the same level of expertise that a similar team of Civil Engineering craftsman would.

There are several teams that are led by one or two Civil Engineering craftsman to provide direction. The majority of the team members are military pulled from their designated jobs; however, there are several teams that include civilians. In some cases teams are comprised of civilian overhires sponsored by a unit other than Civil Engineering. There are base sponsored teams supported by the different groups who provide members. These teams do projects for the entire base. In most cases, the teams represent a particular organization and only perform work on facilities within the organization.

Over 60 percent of the bases contacted had at least one organized team. Table 1 gives a sampling of teams at various bases. This does not include counting bases with access to federal prison camps, who use inmate labor towards construction projects. The teams prove to be very beneficial to both the base and the self-help center.

In most instances the center can be reasonably assured the teams will perform quality work, and they don't require as much administrative oversight. They provide commanders a great opportunity to achieve work that otherwise would not be able to get done. Being detailed to the team on a full-time basis also limits interruptions during construction to take care of everyday job related responsibilities. They are responsible for fairly impressive and large-scale projects. They are credited with saving organizations thousands of dollars over that of a contractor.

However, when determining the amount of money saved by these teams, as well as the entire self-help program, no one seems to take into account the cost of these teams to perform the work. This issue will be a major factor analyzed when attempting to answer the question, is self-help truly cost effective. The next topic will provide a basis of understanding for the type and scope of projects taking place.

Types of projects

As previously mentioned, the initial concept of self-help was to provide base organizations a quick, efficient way to avoid the Civil Engineering backlog, and accomplish small-scale projects by themselves. Small-scale projects still exist, but in addition, the system is also filled with large-scale projects encompassing multi-craftsmanship disciplines.

At least one large major building renovation has taken place in the past two years or is in progress at each of the large bases contacted. Material costs for these projects ranged from \$15,000 to over \$200,000. Project construction times have ranged from six months up to a year to complete. In many cases, these renovations required the installation of new mechanical, electrical and plumbing systems.

Civil Engineering support was usually relied upon to support these functions although several of the organized teams performed the work themselves. The scope of these projects normally called for the initial gutting of the existing building, installation of new ceilings, sheetrock walls, and floor coverings. The scope of projects undertaken appear to be increasing with the increase of organized teams. The majority of the projects out there would be classified as quality of life improvements and there is no disputing their benefit to the base. The next section will discuss the general quality of work performed by the organizations.

Level of quality and cases of disruption to mechanical and electrical systems

Surprisingly, according to center supervisors, the level of poor quality projects was lower than expected. The majority of estimates indicating poor work or requiring Civil Engineering interaction to fix a problem ranged from one to five percent. Only three out of forty bases reported having problems on more than ten percent of the projects. The majority of the stores listed increased involvement on the part of the stores as one reason for a decline in projects deemed unacceptable. A second reason is the increase in organized teams who quickly learn from their mistakes, and are usually assured of having the proper craftsmanship to begin with. Examples of common mistakes were the

mishanging of wallpaper, and items out of square such as doorframes. Some of the more serious mistakes included a misguided self-help project involving electrical wiring. After completion of the project, it was discovered that the lights to a section of offices could not be turned off. Over a year later, the problem was presented to Civil Engineering. It cost \$13,000 to correct the problem. The largest mistake found was a project to renovate an entire building. The team working the project got in over their heads and had to be bailed out by a contractor at a cost of over \$100,000.

The problem of interfering with existing mechanical systems was deemed to be a very small percentage. There were plenty examples given of past problems where Civil engineering had to come in and reduct or rebalance the system. Problems of this nature arise when a unit unknowingly puts up a new wall without regards for the overhead supply or return air system. After the project is completed, it isn't long before Civil Engineering receives complaints about the cooling or heating system in the building. The largest example of this situation occurred in a hangar where the office layout was continuously rearranged by self help. The entire mechanical system had to be redesigned and refitted to regain efficiency.

The same holds true with electrical systems. Most present day problems have been eliminated. Anything dealing with live power is only performed by Civil Engineering or a team with a certified electrician. There still exists an array of problems from past self help projects that didn't take into consideration proper electrical codes. Many of these are in older buildings that were originally built without sufficient electrical outlets to meet the demands of today's computer age and microwave ovens. Most of the problems affecting mechanical systems now occur due to the next topic, non approved projects.

Problems with non-approved projects

Virtually every center was able to cite a case of a non-approved project but for the most part did not consider them to be at a high enough level to be determined a problem. These accounted for most of the problems affecting mechanical systems. Projects are usually shut down on the spot until the proper paperwork is submitted and approved. Common examples of unauthorized projects often were not a true project, but a poorly conceived effort involving extension chords to provide additional electrical outlets for unit snackbars or air conditioners. The increased interaction of the zonal system also makes it more difficult to begin a project without authorization. And the increased publicity given to self-help through base newspapers and other media outlets, has kept the unknowing person from starting something on their own. It is being concluded that regardless of what direction self-help would take we will probably always have to deal with individuals looking to get around the system. This leads to the last topic to be covered, the pride of ownership factor.

Impact of pride of ownership factor

The pride of ownership factor is one of the key elements behind some of the strong support the program receives from senior leadership, both Air Force and Civil Engineering. One of the assumptions is individuals who perform self-help in their own work areas will be more inclined to take care of it, along with an inner sense of pride in their accomplishments. One example of this was provided by a Civil Engineering general. Civil Engineering had just completed renovating a base munitions bay facility. Within months a lack of respect towards the facility by the occupants led to holes in the walls etc.

To solve the problem, the unit's commander, obtained materials and made everyone come in on the weekends to return the facility to its original state. This eliminated the problem of facility abuse, as the occupants now kept an eye one another to properly maintain the upgraded environment.

Fifty individuals involved with self-help projects were interviewed to get a feel for their opinions on pride of ownership. Twenty of the 50 were individuals working as part of an organized team. The increase in organized teams questions the pride of ownership factor. If they are doing the work for a work area other than their own, it is almost the same as having Civil Engineering or a contractor do it. As expected, everyone was in favor of having their office areas, break areas, etc., improved. Each of the members working as part of an organized team were excited about their opportunity to perform construction related activities. They found it a refreshing break from their normal work routine. Half of the non-organized team personnel were proud of the work performed and found it rewarding to work in an environment they helped create. The other 15 stated that pride of ownership had nothing to do with their existing performance. Comments ranged from it's a good way to get an extra enlisted performance report bullet, to, if we didn't do it ourselves we would still be waiting for Civil Engineering to show up. With only a sample of 50, it is hard to draw any definitive conclusions on the subject. Once again the argument is not against the idea that improved working environments lead to increase performance, but there may be a more efficient way to get there.

Table 1. Self-help Center Data

Base #	# Personnel	Yearly Budget In Thousands	Yearly Projects	Organized Teams
1	2	700	400	one
2	6	200	50	none
3	3	400	200	none
4	2	200	120	four
5	5	500	150	three
6	4	250	80	one
7	1	325	65	one
8	3	175	50	none
9	4	450	150	one
10	2	300	160	none
11	7	360	180	none
12	5	800	520	one
13	12	148	150	none
14	5	180	80	one
15	1	100	35	none
16	6	500	300	four
17	3	170	125	none
18	6	700	125	one
19	2	600	120	one
20	8	635	110	two
21	7	460	135	none
22	4	330	90	two
23	4	800	500	two
24	3	200	100	one
25	3	150	60	one

Chapter 5

Analysis and Evaluation

The self-help program definitely provides both tangible and intangible benefits to the base. The issue is whether or not it has grown to the point where it is in some cases no longer cost effective. As discussed earlier, it is difficult to try and quantify the intangible benefits of the pride of ownership factor. However, there are some areas that can be quantified.

The most obvious quantifiable cost is the sunken labor costs of the individuals performing the work. It has been established that self-help work is currently being performed during duty time, and in the case of organized teams, on a full time basis. Several bases are now tracking the estimated amount of hours put into the project by self-help laborers. In most cases, the amount of material labor is deducted from the estimated cost of a contractor or SABRE team. The difference between the two is then associated with a cost savings. The amount of indirect labor costs was examined to determine the real savings. For example, a project to renovate a 1930's type facility to construct a conference room required \$25,000 in construction materials. Scope of the project included gutting the existing facility, and the standard installation of new sheetrock, vinyl wall coverings, new ceiling, floor coverings, etc. There were electrical and mechanical modifications involved in the project of which Civil Engineering provided assistance.

Estimated contractor cost to complete the work was determined to be \$50,000. Civil engineering labor came to \$1,500. A direct look at the project would indicate a cost savings of \$23,500. However, it took the individuals working on the job 4000 hours to complete it.

Civil Engineering labor rates range anywhere from 20 to 30 dollars per hour. This takes into account the individuals salary and associated overhead. In this example, a labor rate of \$15 per hour is going to be arbitrarily used. This figure assumes any overhead costs would be picked up by the owning unit. Four thousand hours at a rate of \$15/hr comes to \$60,000. Adding this amount to the material and Civil Engineering labor costs adds up to \$86,500. Comparing this amount to the estimated contractor cost indicates it cost over \$35,000 more to complete the project using self-help. It is being assumed the time put in by the self-help center and material acquisition process, would cancel out the time put forth by Civil Engineering and procurement functions to monitor a procured contracted or SABRE effort.

The following example represents an actual estimate for SABRE to perform a project. The project involved the renovation of a World War II facility. The scope included the standard gutting and preparing the walls for new sheetrock, ceiling etc. In addition, old windows were replaced throughout the facility. SABRE's cost to perform the work was \$70,000. Material costs came to \$17,000. Civil Engineering provided \$6,000 in labor costs to install a new heat pump system and upgrade the electrical components. Once again, on first look it would appear that on paper the project saved \$47,000. It took the unit performing the work 6,000 hours to complete the job over a six month period. Apparently there was a lot of time intensive labor involved in the initial gutting of the

facility. Six Thousand hours at \$15/hr totals to \$90,000. Combining the material and Civil Engineering labor costs leads to a total project cost of \$113,000. Compared to the SABRE estimate of \$70,000, this leaves a deficit of \$43,000. To be fair, seldom is there a SABRE project of this size where some sort of change order isn't required. However, adding another \$10,000 for change orders to the estimated contract price still leaves a deficit of over \$30,000.

Virtually every renovation project examined came to the same conclusion. The larger the project, the bigger the difference in compared costs. Part of the reason is the inefficiency of the teams doing the work. There is a learning curve involved with the project that leads to a lot of non-productive time with individuals standing around and watching, or waiting for a misplaced or newly required material items to arrive. This condition wasn't as prevalent with the organized teams who for the most part are efficiently operated.

Conversations with one of the experienced teams stated they had no choice but to take longer than a regular Civil Engineering team because of a lack of proper tools. The self-help centers provide basic tools for check out, but are really not equipped to provide tools such as nailguns and specialized plumbing tools. Several of the organized teams contacted had used unit funds to purchase their own set of tools which helped alleviate the problem.

A negative behind the organized team concept is when encountering a job stoppage situation it leads to mostly dead time. Unlike a Civil Engineering team who could be quickly diverted to support another project, the organized team often do not have another job and therefore waits out the job stoppage item to be resolved.

Shifting to the concern of poor quality work, or disruption to mechanical or electrical systems requiring Civil Engineering intervention to fix, it does not appear to be the problem it once was. Virtually everyone contacted had a horror story of a misguided self-help project that wasted money or created more problems than it originally intended to fix. However, this past trend appears to be declining and can be attributed to the improved direction and management practices provided by self-help centers, and the increase of full time teams with qualified craftsman. Stores are really clamping down on projects involving electrical or mechanical work. They are also taking more time to ensure the project is properly planned and the personnel involved have enough proficiency to take on the job.

The self-help center supervisors indicated they could reduce the problem even further if they had additional personnel to properly monitor the project workload. Instances requiring projects to be redone were not tracked to the point they could be properly addressed. This leads to the conclusion that it is an area proper operational practices can eliminate, and doesn't appear to be the prevalent problem it was in the past. The next chapter will sum up additional conclusions and provide recommendations to consider.

Chapter 6

Conclusions and Recommendations

Has the concept of self-help work requests reached a point where it is no longer cost effective? This subject raises several other questions. Do the intangible benefits of pride of ownership offset these costs? If pride of ownership is such a major factor, does use of organized teams defeat that purpose? And finally, what are the short and long-term effects on infrastructure maintenance from diverting operational money towards self help?

When looking at the program from a purely quantitative viewpoint, it is quite evident there are more effective ways of accomplishing work. In most cases, if you take into consideration the labor cost of the individuals performing the work, it is definitely more cost effective to have the project performed by a contractor. The exception to this is the small scale project that is not very labor intensive. This also does not apply if the individuals perform the work on non-duty time. However, the majority of the work is taking place during duty time. Based on opinions of senior Civil Engineering leadership, this difference in cost is an acceptable trade off due to the pride of ownership factor. Its hard to argue against this point of view when work is being accomplished by individuals working on their own areas. However, increasing number of full time organized teams appears to contradict the emphasis of pride of ownership. It is recommended an Air Force wide study be conducted to further evaluate the pride of ownership factor.

One of the largest factors behind the increased push towards self-help is it would not be able to be done otherwise. There is no contesting the inability of Civil Engineering to meet the wants and desires of base personnel. This report questions the ability of units and bases to provide full time self-help teams to make up for this deficiency. How can units afford to provide manning for full time self-help teams, some manned with civilian overhires? How are the jobs these individuals are actually responsible for being accomplished?

Organized teams, no matter how qualified, would be more efficient if they were authorized Civil Engineering slots. It is ironic the present solution to make up for the decrease in Civil Engineering manpower, is to create base teams made up of the most qualified personnel available. This study recommends all organized teams be evaluated for the impact of not performing assigned duties. Available qualified personnel, especially civilian overhires should be detailed to Civil Engineering. A Civil Engineering operated base self-help team would be more efficiently operated than the teams on their own. At a minimum, several of these individuals should be detailed to the self-help center to help with daily operations.

One final area reviewed is the impact self-help has on the ability of the base Civil Engineer to maintain the infrastructure. The answer to this question will differ from base to base. The Base Civil Engineer should be given the authority to make this determination. Self-help projects requests should be consolidated and prioritized against maintenance requirements. There should be a definitive assessment of a facilities maintenance requirements both present and future to help determine the feasibility of requests for self-help aesthetic improvements. A manpower standard should be created to

properly man the self-help centers to avoid having to pull personnel out of hide. Maximum cost effectiveness can only be obtained with stores manned with sufficient technical expertise to plan and monitor the work being accomplished. Taking the highly motivated skilled personnel out of the shops has a negative impact on the zonal shops ability to perform daily maintenance functions. Without these authorized positions either, the maintenance operations, or the quality and effectiveness of the self-help program, has to suffer. Table 2 summarizes the recommendations of this paper.

Table 2. Self-Help Recommendations

1. Authorized positions should be created to properly manage the self-help centers.
2. The use of full-time organized self-help teams warrants an Air Force manpower review.
3. Self-help project requests should be consolidated and prioritized against maintenance requirements.
4. An Air Force wide study should be conducted to further evaluate the pride of ownership factor.
5. Zones should be briefed on status of all self-help projects taking place in their area.
6. Base Civil Engineers should have authority to determine the amount of assets dedicated to self-help.

Chapter 7

Summary

This project studied the cost effectiveness of the Civil Engineering self-help program. The history of the program and its development into the present day operation was reviewed. Senior Civil Engineering viewpoints and opinions on the program were presented. The operational practices of the program based on regulations, visits and interviews with various self-help centers were discussed.

Analysis of the above information concluded self-help from a purely quantitative point of view, is not cost effective. However, when properly managed and executed as intended by existing regulations, coupled with the pride of ownership factor, it continues to be a viable method to accomplish work. Several findings require further review. The existence of full-time organized self-help teams defeats the purpose of pride of ownership, and warrants a review of manpower standards. Lack of authorized manpower positions to operate the self-help centers jeopardizes both the quality of self-help work, and Civil Engineering in-house maintenance capability.

If Civil Engineering budgets continue to decline, base organizations will continue to rely on the self-help program to meet their needs. Self-help is a great way to improve office morale and working environment. However, it should not be considered a cure for Civil Engineering deficiencies. It was not designed for this purpose nor should it be.

The recommendations presented in this project require further review to ensure the program operates in the most cost efficient manner.

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